

# Silicon Carbide on Diamond Substrates and Related Devices and Methods

## Abstract

A method of forming a high-power, high-frequency device in wide bandgap semiconductor materials with reduced junction temperature, higher power density during operation and improved reliability at a rated power density is disclosed, along with resulting semiconductor structures and devices. The method includes adding a layer of diamond to a silicon carbide wafer to increase the thermal conductivity of the resulting composite wafer, thereafter reducing the thickness of the silicon carbide portion of the composite wafer while retaining sufficient thickness of silicon carbide to support epitaxial growth thereon, preparing the silicon carbide surface of the composite wafer for epitaxial growth thereon, and adding a Group III nitride heterostructure to the prepared silicon carbide face of the wafer.